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Oxygen abundance maps of CALIFA galaxies

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Abstract

© 2016 The Authors. Published by Oxford University Press on behalf of the Royal Astronomical Society.We construct maps of the oxygen abundance distribution across the discs of 88 galaxies using Calar Alto Legacy Integral Field Area survey (CALIFA) Data Release 2 (DR2) spectra. The position of the centre of a galaxy (coordinates on the plate) was also taken from the CALIFA DR2. The galaxy inclination, the position angle of the major axis, and the optical radius were determined from the analysis of the surface brightnesses in the Sloan Digital Sky Survey (SDSS) g and r bands of the photometric maps of SDSS Data Release 9. We explore the global azimuthal abundance asymmetry in the discs of the CALIFA galaxies and the presence of a break in the radial oxygen abundance distribution. We found that there is no significant global azimuthal asymmetry for our sample of galaxies, i.e. the asymmetry is small, usually lower than 0.05 dex. The scatter in oxygen abundances around the abundance gradient has a comparable value, ≲0.05 dex. A significant (possibly dominant) fraction of the asymmetry can be attributed to the uncertainties in the geometrical parameters of these galaxies. There is evidence for a flattening of the radial abundance gradient in the central part of 18 galaxies. We also estimated the geometric parameters (coordinates of the centre, the galaxy inclination and the position angle of the major axis) of our galaxies from the analysis of the abundance map. The photometry-map-based and the abundance-map-based geometrical parameters are relatively close to each other for the majority of the galaxies but the discrepancy is large for a few galaxies with a flat radial abundance gradient.

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Keywords

Galaxies: abundances, ISM: abundances -HII regions